Texas Water Resources Institute TR-446
September 2013

Development of a Synergistic, Comprehensive Statewide Lone Star Healthy Streams Program

Dr. Kevin Wagner, Texas Water Resources Institute
Dr. Larry Redmon, Texas A&M Agrilife Extension Service
Jennifer Peterson, Texas A&M AgriLife Extension Service

Texas Water Resources Institute
make every drop count

Development of a Synergistic, Comprehensive Statewide Lone Star Healthy Streams Program

Prepared for:
Texas State Soil and Water Conservation Board

By:
Dr. Kevin Wagner, Texas Water Resources Institute
Dr. Larry Redmon, Texas A&M Agrilife Extension Service
Jennifer Peterson, Texas A&M AgriLife Extension Service

Texas Water Resources Institute Technical Report 446
September 2013

Executive Summary

According to the 2008 Texas Water Quality Inventory and 303(d) List, 295 waterbodies are impaired for bacteria. A primary strategy for reducing bacteria in rural waterbodies is to provide technical and financial assistance to implement best management practices (BMPs) to reduce bacteria runoff from livestock. However, in order to motivate a change in management, educational programs are needed for the major livestock classes and feral hogs to increase awareness of the bacteria issues and encourage voluntary implementation of BMPs as well as participation in technical and financial assistance programs to reduce the runoff of bacteria which will ultimately lead to improved water quality.

The Texas Water Resources Institute, Texas A&M AgriLife Extension Service, and Texas State Soil and Water Conservation Board worked with the livestock industry, natural resource agencies, soil and water conservation districts, and landowners to expand the Lone Star Healthy Streams Program and establish it as the State's mechanism to provide a coordinated and comprehensive education program designed to increase awareness of the bacteria issues associated with grazing and dairy cattle, poultry, horses, and feral hogs; and encourage voluntary implementation of BMPs to reduce the runoff of bacteria which will ultimately lead to improved water quality.

Through this project, an online bibliography consisting of approximately 600 papers on BMP effectiveness for reducing bacteria was developed and made accessible to the public. These studies along with educational material developed by Texas State Soil and Water Conservation Board and AgriLife Extension projects were used to develop five standardized resource manuals and five presentations on bacteria issues and associated BMPs for four major classes of livestock as well as feral hogs.

These materials have been made available through not only a resource website, which alone reached almost 1,200 unique visitors during the project, but also through development of an interactive course and delivery of approximately 60 presentations to more than 5,000 people around Texas and the U.S.

Response to the program has been very positive to date. Survey results indicate that most participants were mostly or completely satisfied with the educational program and more importantly, more than two-thirds planned to take action as a result of the program.

If indeed two-thirds of participants implement practices learned at LSHS programs, our goal of reducing the amount of bacteria entering Texas waterbodies from the major classes of livestock and feral hogs will surely be achieved.

Contents

List of Figures

List of Tables

List of Acronyms and Abbreviations

ANSC	Texas A&M University Animal Science Department
BAEN	Texas A&M University Biological and Agricultural Engineering Department
BMP	Best Management Practice
CEU	Continuing Education Credits
CIG	Conservation Innovation Grants
CWA	Clean Water Act (Federal Water Pollution Control Act)
DOPA	Dairy Outreach Program Area
EPA	US Environmental Protection Agency
GLCI	Grazing Lands Conservation Initiative
GRP	Grassland Reserve Program
ICA	Independent Cattlemen's Association of Texas
LSHS	Lone Star Healthy Streams
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
POSC	Texas A&M University Poultry Science Department
QPR	Quarterly Progress Report
SCSC	Texas A&M University Soil and Crop Sciences Department
SWCD	Soil and Water Conservation Districts
TAD	Texas Association of Dairymen
TAHC	Texas Animal Health Commission
TCFA	Texas Cattle Feeders Association
TDA	Texas Department of Agriculture
TFB	Texas Farm Bureau
TPF	Texas Poultry Federation
TPWD	Texas Parks and Wildlife Department
TSCRA	Texas and Southwestern Cattle Raisers Association
TSSWCB	Texas State Soil and Water Conservation Board
TWA	Texas Wildlife Association
TWRI	Texas Water Resources Institute
WFSC	Texas A&M University Wildlife and Fisheries Department
WQMP	Water Quality Management Plan
USDA	US Department of Agriculture

Introduction

Project Background

According to the 2008 Texas Water Quality Inventory and 303(d) List, 295 waterbodies in Texas were impaired for bacteria. One of the primary strategies for reducing bacteria in these waterbodies is to provide technical and financial assistance to implement best management practices (BMPs) to reduce bacteria runoff from livestock. However, in order to motivate a change in management, educational programs are needed for the major livestock classes (grazing and dairy cattle, poultry, horses), as well as feral hogs, to increase awareness of the bacteria issues and encourage voluntary implementation of BMPs as well as participation in technical and financial assistance programs to reduce the runoff of bacteria which will ultimately lead to improved water quality.

The TSSWCB, in collaboration with TWRI, AgriLife Extension, and other cooperating entities, had done much to develop educational materials on bacteria issues for the major classes of livestock through multiple CWA §319(h) NPS grants from EPA. Notwithstanding this significant amassed body of work, there lacked a unifying and overarching theme to the educational materials developed through these disparate projects. There was a critical need to create synergy between these prior projects to establish the Lone Star Healthy Streams Program as the State's mechanism to provide a coordinated and comprehensive education program designed to increase awareness of the bacteria issues associated with grazing and dairy cattle, poultry, horses, and feral hogs; and encourage voluntary implementation of BMPs to reduce the runoff of bacteria which will ultimately lead to improved water quality. This project worked to bring the amassed body of work together under the umbrella of the Lone Star Healthy Streams Program.

Project Goal

The goal of this project was to reduce the amount of bacteria entering Texas waterbodies from the major classes of livestock by expanding the Lone Star Healthy Streams (LSHS) education program through integration of grazing cattle, horse, poultry, dairy cattle, and feral hog components into a synergistic, industry endorsed LSHS Program ready for statewide delivery.

Objectives

- Coordinate the development of the LSHS Program with a livestock industry steering committee, a development committee and AgriLife leadership
- Compile the educational materials developed by ongoing Texas State Soil and Water Conservation Board and AgriLife Extension projects and develop standardized manuals and presentations on bacteria issues and associated BMPs for the major classes of livestock as well as feral hogs
- Make the developed educational materials easily accessible to the public, landowners, county agents, soil and water conservation districts, decision makers and others through the development of an interactive website

Tasks

The project consisted of four tasks: (1) Project Administration, (2) LSHS Program Coordination, (3) LSHS Program Development, and (4) Development of Interactive Website to Increase Access to LSHS Program.

Task 1: Project Administration

Subtask 1.1: Preparation of electronic quarterly progress reports (QPRs)

TWRI prepared and submitted 12 Quarterly Progress Reports which can be viewed online at http://lshs.tamu.edu/projects/ under "Projects" – "Lone Star Healthy Streams Program"

- January 15, 2010
- April 13, 2010
- July 15, 2010
- October 13, 2010
- January 14, 2011
- April 11, 2011
- July 15, 2011
- October 13, 2011
- January 13, 2012
- April 11, 2012
- July 13, 2012
- October 12, 2012

Subtask 1.2: Performance of accounting functions and submission of reimbursement forms

Accounts were maintained by TWRI personnel and all reimbursement forms were submitted to TSSWCB in a timely manner. Table 1 summarizes expenditure reported in each quarter.

Table 1: Summary of Project Expenses

Invoice #	Date From	Date To	Invoice $$	Balance
R018002	12.1.09	2.28.10	938.99	378,662.01
R018285	3.1.10	5.31.10	2,734.00	375,928.01
R018578	6.1.10	8.31.10	23,570.34	352,357.67
R018909	9.1.10	11.30.10	24,991.56	327,366.11
R019220	12.1.10	2.28.11	26,963.29	300,402.82
R019541	3.1.11	5.31.11	26,631.54	273,771.28
R019865	6.1.11	8.31.11	26,455.90	247,315.38
R020188	9.1.11	11.30.11	29,267.91	218,047.47
R020493	12.1.11	2.29.12	39,927.68	178,119.79
R020866	3.1.12	5.31.12	47,102.60	131,017.19
R021180	6.1.12	8.31.12	67,531.85	63,485.34
R021483	9.1.12	11.30.12	41,205.37	22,279.97
R021709	12.1.12	2.28.13	17,867.93	4,412.04

Subtask 1.3: Coordination and hosting of communication activities between project partners to discuss project activities, project schedule, communication needs, deliverables, and other requirements.

Meetings were held by project partners on the dates below to discuss coordination efforts such as the contract, budget, deliverables, activities, and schedule.

- June 24, 2010
- September 28, 2010
- October 19, 2010
- March 9, 2011
- June 23, 2011
- October 24, 2011
- February 15, 2012

Subtask 1.4: Development of Final Report

The final report was compiled by TWRI staff and submitted on April 30, 2013.

Task 2: LSHS Program Coordination

Subtask 2.1: Appointment of Extension Program Specialist for carrying out Tasks 2 and 3.

Jennifer Peterson was hired as the Extension Program Specialist on June 1, 2010.

Subtask 2.2: Establishment of LSHS Program Steering Committee

TWRI and AgriLife Extension utilized the framework of the TSSWCB project 06-05 LSHS Project Steering Committee to establish a LSHS Program Steering Committee to direct this synergistic project. This LSHS Program Steering Committee included entities representing grazing and dairy cattle, poultry, horses, and feral hog control including:

- Texas State Soil & Water Conservation Board
- Texas Cattle Feeders Association
- Independent Cattlemen's Association
- Victoria Soil & Water Conservation District
- Hall-Childress Soil & Water Conservation District
- USDA-Agricultural Research Service
- Texas & Southwestern Cattle Raisers Association
- Texas Water Resources Institute
- Texas A&M AgriLife Extension Service
- Texas Wildlife Association
- Grazing Lands Conservation Initiative
- Texas Farm Bureau
- Texas Department of Agriculture
- USDA-Natural Resources Conservation Service
- Welder Wildlife Foundation
- Texas A&M AgriLife Research
- Little Wichita Soil & Water Conservation District
- Texas Association of Dairymen
- Texas H.O.R.S.E
- Texas Pork Producers Association
- Texas Poultry Federation
- Texas Animal Health Commission
- Texas Parks & Wildlife Department

The LSHS Program Steering Committee served as the review panel for the educational materials developed through the project, meeting three times throughout the project on October 19, 2009, October 25, 2010, and October 24, 2011. All presentations, sign in sheets and resources from the meetings are available on-line at http://lshs.tamu.edu/projects/. Further, program endorsements were received from Independent Cattlemen's Association of Texas, Texas Poultry Federation, Texas HORSE, Texas Association of Dairymen, Texas Pork Producers Association, Texas Wildlife Association, Texas Parks and Wildlife Department, Texas and Southwestern Cattle Raisers Association, USDA-Natural Resource Conservation Service, and Grazing Lands Conservation Initiative.

Subtask 2.3: Compilation of project information and development of appropriate educational materials

The Extension Program Specialist worked with the LSHS Program Development Committee (Table 2) to develop program educational materials. The LSHS Program Development Committee met on September 28, 2010 and identified the BMPs for each animal category.

Table 2: Lone Star Healthy Streams Program Development Committee

Name	Organization - Department	Title
Brian VanDelist	AgriLife Research – TWRI	Project Manager
Jennifer Peterson	AgriLife Extension – SCSC	Program Specialist
Kevin Wagner	AgriLife Research – TWRI	Associate Director
Larry Redmon	AgriLife Extension – SCSC	State Forage Specialist
Aaron Wendt	TSSWCB – NPS Management	Statewide Watershed Planning Coordinator
Mark Cochran	TSSWCB – Poultry WQMP	Program Supervisor
Ellen Jordan	AgriLife Extension – ANSC	Dairy Specialist
Nathan Smith	TSSWCB – NPS Management	Information Specialist
Mitch Conine	TSSWCB – NPS Management	Project Manager
Pete Gibbs	AgriLife Extension	Associate Agency Director
TJ Helton	TSSWCB – NPS Management	NPS Program Coordinator
Craig Coufal	AgriLife Extension – POSC	Poultry Specialist
Jim Cathey	AgriLife Extension – WFSC	Wildlife Specialist
Dennis Sigler	AgriLife Extension – ANSC	Horse Specialist
Daren Harmel	USDA-ARS	Agricultural Engineer
Sam Feagley	AgriLife Extension – SCSC	State Soil Environmental Specialist
Ronald Woolley	AgriLife Extension	East Region Program Director
Todd Bilby	AgriLife Extension – ANSC	Dairy Specialist
Saqib Mukhtar	AgriLife Extension – BAEN	Waste Management Specialist
Joe Paschal	AgriLife Extension – ANSC	Livestock Specialist
Monty Dozier	AgriLife Extension	South Region Program Director
Galen Chandler	AgriLife Extension	North Region Program Director
Marvin Ensor	AgriLife Extension	West Region Program Director

Following the identification of the BMPs at this initial meeting, the Extension Program Specialist then worked individually with the species specific specialists to develop each resource manual and accompanying presentation.

Subtask 2.4: Ensure Program Support and Statewide Delivery

Throughout the project, the State Forage Specialist and TWRI Associate Director worked closely with Extension Regional Program Directors, County Agents, Specialists, and other Extension Leadership to ensure that the LSHS Program is supported and delivered statewide.

Task 3: LSHS Program Development

Subtask 3.1: Compilation of information and educational materials developed through TSSWCB and NRCS projects

The Extension Program Specialist worked with the Principal Investigators of ongoing or recently completed Extension projects funded by the TSSWCB and USDA-NRCS to ensure that relevant project results were integrated into the LSHS program. Project results from the following projects were integrated into the program:

- TSSWCB project 06-05, *Lone Star Healthy Streams (http://twri.tamu.edu/reports/2011/tr410.pdf)*
- TSSWCB project 06-08, *Education Program for Improved Water Quality in Copano Bay (http://twri.tamu.edu/reports/2012/tr422.pdf)*
- TSSWCB project 06-07, *Monitoring and Educational Programs Focused on Bacteria and Nutrient Runoff on Dairy Operations in the Leon Watershed*
- TSSWCB project 05-06, *PLAN for Tomorrow: Poultry Litter Application on New Sites*
- TSSWCB project 08-07, *Implementing Agricultural Nonpoint Source Components of the Plum Creek Watershed Protection Plan*
- TSSWCB project 10-52, *Evaluation and Demonstration of BMPs for Cattle on Grazing Lands for the Lone Star Healthy Streams Program (http://twri.tamu.edu/reports/2012/tr437.pdf)*
- USDA-NRCS Grassland Reserve Program (GRP) project, *Environmental Management of Grazing Lands (http://twri.tamu.edu/reports/2008/tr334.pdf)*
- USDA-NRCS Conservation Innovation Grants (CIG) project, *Bacteria Runoff BMPs for Intensive Beef Cattle Operations (http://twri.tamu.edu/reports/2010/tr395.pdf)*

In addition, an intensive search of scientific literature was completed to locate research dealing with bacteria removal efficiencies from individual BMPs. Research was also sought on individual BMP design and relevance to beef cattle, dairy cattle, horses, poultry, and feral hogs. All literature was compiled into an EndNotes searchable database that includes the article citation, abstract, and article PDF. The database is available online, accessible from http://lshs.tamu.edu/research/.

Subtask 3.2: Development of 5 standardized educational manuals on bacteria issues and BMPs for addressing bacteria runoff from grazing cattle, dairy cattle, poultry, horses, and feral hogs

With input from the LSHS Steering and Program Development Committees and information compiled from previous research, the Extension Program Specialist developed five standardized educational manuals on bacteria issues and BMPs for addressing bacteria runoff from grazing cattle, dairy cattle, poultry, horses, and feral hogs. Information on BMPs to reduce bacteria loads to surface waters, Clean Water in agriculture, and Cost-Share and Technical Assistance Programs were included in the resource manuals. Input, comments and review from the LSHS Program Steering Committee, the Ag Council, and TSSWCB were conducted prior to finalization. Feedback from producer organizations such as the Texas Poultry Federation, Texas and Southwestern Cattle Raisers Association, Texas Association of Dairymen, Texas Farm Bureau, Texas Pork Producers Association, and Texas Wildlife Association along with comments provided by the Texas Parks and Wildlife Department and Texas State Veterinarian were also integrated into the manuals.

Publication numbers for the manuals are as follows: Beef (B-6245), Dairy (B-6253), Horse (B-6254), Poultry (B-6255), and Feral Hog (B-6256). Printed manuals were distributed to project partners and industry groups and to interested soil and water conservation district directors at the 72nd Annual Meeting of SWCD Directors on October 29-31, 2012. The manuals can be found online at the LSHS website under the “Publications” tab (http://lshs.tamu.edu/publications/), Texas A&M AgriLife Extension Forages website (http://forages.tamu.edu/) under the “Water Quality” tab, and the Texas A&M AgriLife Extension Bookstore website (https://agrilifebookstore.org/). All of the BMP publications are up on the LSHS website under the "BMPs" tab (http://lshs.tamu.edu/bmps/).

Subtask 3.3: Development of standardized educational presentations on bacteria issues and BMPs for addressing bacteria runoff from grazing cattle, dairy cattle, poultry, horses, and feral hogs to be used for in-person LSHS Program delivery

Educational presentations were developed by the Extension Program Specialist for addressing bacteria runoff from:

- Grazing cattle - http://lshs.tamu.edu/media/384950/lshs%20beef%20presentation.pdf
- Dairy cattle - http://lshs.tamu.edu/media/384953/lshs%20dairy%20presentation.pdf
- Poultry - http://lshs.tamu.edu/media/384962/lshs%20poultry%20presentation.pdf
- Horses - http://lshs.tamu.edu/media/384959/lshs%20horse%20presentation.pdf
- Feral hogs - http://lshs.tamu.edu/media/384956/lshs%20feral%20hog%20presentation.pdf

Subtask 3.4: Development of promotional materials for the LSHS Program

The Extension Program Specialist developed a variety of promotional materials for use for LSHS Program delivery and to inform the public of the availability of the LSHS Program. Promotional materials developed for the project include development of a logo, a project fact sheet (http://twri.tamu.edu/media/274122/lshs_4.2012.pdf), and a LSHS brochure (http://lshs.tamu.edu/media/385030/lshs_brochure.pdf).

Subtask 3.5: Establishment of CEU credits for educational program

The Extension Program Specialist worked with TDA and Texas Certified Crop Advisors Program to establish 4 CEU credits for the Texas Certified Crop Adviser Program and 1 CEU through the Texas Department of Agriculture (TDA) Certified Pesticide Applicators program to encourage participation by landowners and crop advisors in the LSHS program.

Subtask 3.6: Development of pre- and post- participant surveys

A survey instrument (Appendix A) was developed to evaluate changes in producer knowledge and awareness of important production and environmental issues as well as identify any barriers to producer participation and successful implementation of the program. The survey was utilized on October 29, 2010 at the Luling Foundation Water Field Day. Survey results indicated that 97% of participants were mostly or completely satisfied with the educational program; 100% would recommend the program to others; and 82% were likely to adopt one or more of the BMPs presented during the program to improve water quality. Further, the survey indicated that as a result of the education program, the average knowledge gained was 52%. The survey was more recently conducted for the LSHS component at Ranch Management University held from October 29-November 2, 2012 in Brazos County. During this program, horse, poultry, beef, and hog components were pilot tested. Program participants indicated they were either mostly or completely satisfied with the program; 64% indicated they planned to take action/make changes as a result of the program; 86% indicated the program was a valuable networking opportunity with experts.

Subtask 3.7: Piloting components of the LSHS Program at selected sites in East, Central, and South Texas

Dr. Cavinder piloted the LSHS Horse program on October 30, 2012 as part of Ranch Management University in College Station. Dr. Jordan piloted the LSHS Dairy program on October 31, 2012 in Sulphur Springs, TX at a DOPA training meeting. The poultry, beef, and feral hog programs were piloted at Ranch Management University by Drs. Redmon and Cathey and Jennifer Peterson from October 29-November 1, 2012.

Altogether, more than 5000 people were introduced to the LSHS program and concepts through presentations at the following 59 events (where known, number of participants in parentheses):

- September 17, 2010 – Travis Co. (NA)
- September 24, 2010 – McGregor Research Center Field Day – McLennan Co. (NA)
- October 12-15, 2010 – Ranch Management University (NA)
- October 21, 2010 – Burnet Co. (NA)
- October 26, 2010 – Comanche Co. (NA)
- October 29, 2010 – Luling Foundation Water Field Day (NA)
- December 14, 2010 – Guadalupe Co. (98)
- March 9, 2011 – Victoria Co. TPWD and USDA-NRCS personnel (32)
- March 12, 2011 – Brazos Co. (96)
- March 22, 2011 – Weatherford (67)
- March 28, 2011 – McLennan Co. (60)
- March 31, 2011 – Caldwell Co. (31)
- April 7, 2011 – Henderson Co. (137)
- April 13, 2011 – Brazos Co. (39)
- April 20, 2011 – Wilson, Karnes, Guadalupe, Bee Counties (45)
- April 29, 2011 – Kaufman Co. (40)
- May 5, 2011 – Burleson, Lee Counties (45)
- July 29, 2011 – Oklahoma Cattlemen's Association Annual meeting (112)
- August 11, 2011 – Harris Co. (79)
- August 18, 2011 – Lampasas Co. (69)
- August 25, 2011 – Taylor Co. (78)
- September 1, 2011 – Galveston and Brazoria Co. (67)
- September 6, 2011 – Walker Co. (62)
- September 24, 2011 – Brazos Co. (147)
- September 30, 2011 – Austin Co. (112)
- October 20, 2011 – Johnston Co. (26)
- October 21, 2011 – Falls Co. (84)
- October 28, 2011 – Washington Co. (62)
- November 3, 2011 – Chambers, Liberty, Ft. Bend, Kaufman, Van Zandt counties (92)
- November 12, 2011 – Bexar Co. (45)
- November 14, 2011 – Coryell Co. (46)
- November 17, 2011 – Gonzales Co. (78)
- December 8, 2011 – 19 AgriLife Extension Service District 8 counties (435)
- December 15, 2011 – Edna (78)
- December 16, 2011 – Mabank (112)
- January 24, 2012 – Granbury (68)
- January 27, 2012 – Caldwell (265)
- February 7, 2012 – Waco (201)
- March 23, 2012 – McGregor (64)
- March 29, 2012 – Athens (189)
- March 31, 2012 - Fort Worth (80)
- March 2012 – San Jacinto Co. (28)
- April 5, 2012 - Lampasas (24)
- April 13, 2012 - College Station (19)
- April 27, 2012 - Schulenburg (58)
- May 24, 2012 - Hamilton, Freestone, Milam, Coryell, McLennan, Eastland, Falls, and Comanche Counties (82)
- June 7, 2012 – Southeast and South Central Texas Regional Watershed Coordination Steering Committee, Columbus (24)
- June 19, 2012 – Stiles Farm Field Day, Thrall (92)
- June 27, 2012 – Farm Bureau Meeting (251)
- July 24, 2012 – Soil and Water Conservation Society Annual Conference (NA)
- August 6-7, 2012 – Beef Cattle Short Course (415)
- August 30, 2012 – Galveston Co. (64)
- September 7, 2012 – Bastrop Co. (71)
- October 29-November 2, 2012 – Brazos Co. (26)
- October 31, 2012 – Hopkins Co. (45)
- November 16, 2012 – Rusk and Nacogdoches Counties (65)
- December 13, 2012 – 21 AgriLife Extension Service District 8 counties (435)
- January 10, 2013 – Chambers, Liberty, Jefferson counties (32)
- January 16, 2013 – Bosque River Coalition Meeting, Stephenville (25)

Task 4: Development of an Interactive Website to Increase Access to LSHS Program

Subtask 4.1: Distribution of education materials developed in Task 2 though development of an interactive website

An interactive website was developed to make educational materials easily accessible by the public, landowners, county agents, soils and water conservation districts, decision makers, and others. The online modules are available at http://campus.extension.org/course/view.php?id=728.

Subtask 4.2: Quarterly updates to the Website and tracking of Unique Visitors.

From September 2007 through December 2010, the website titled "Improving Water Quality of Grazing Lands" (http://grazinglands-wq.tamu.edu/ - no longer accessible) was used to disseminate information on *Lone Star Healthy Streams* and related projects. In order to develop the project website into a resource website for agricultural producers, watershed stakeholder groups, and agency personnel, the website was transitioned to a new website titled "Lone Star Healthy Streams" in September 2010. This transition resulted in a significant increase in unique visitors to the website (http://lshs.tamu.edu) as can be seen in Figure 1. A total of 1,173 unique visitors viewed the "Lone Star Healthy Streams" website during the project period. In addition, 165 unique visitors viewed the "Improving Water Quality of Grazing Lands" website during the project period.

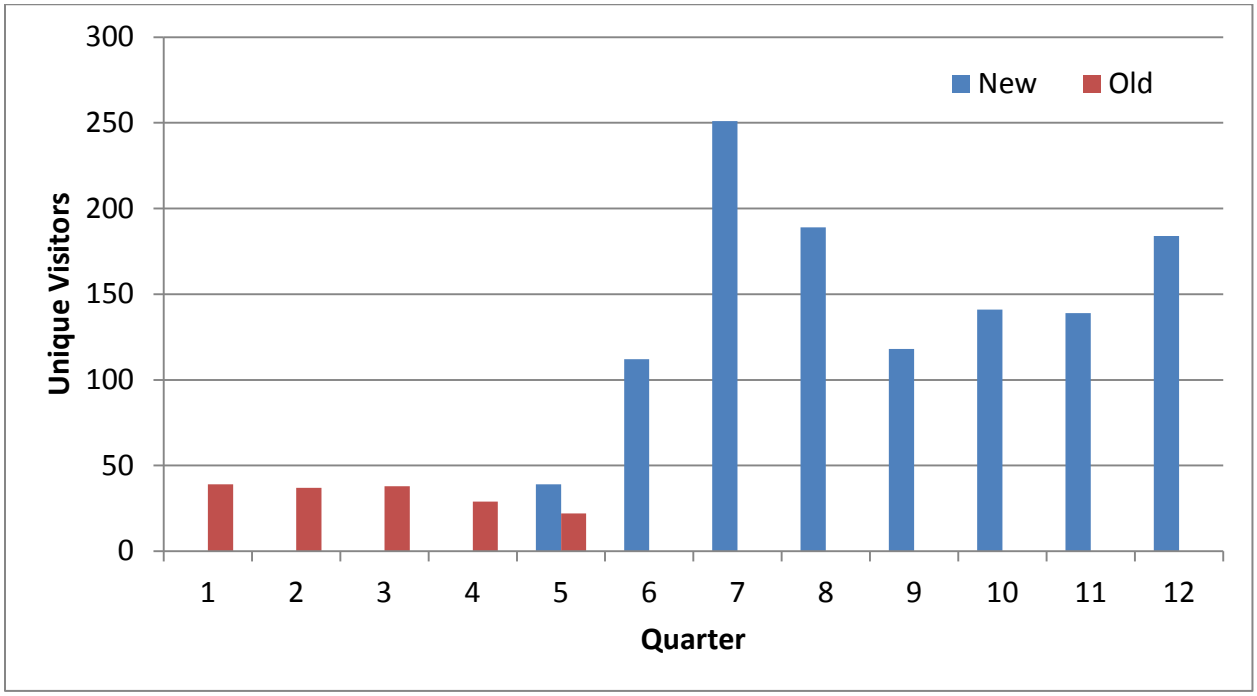

Figure 1: Unique visitors to the "Improving Water Quality of Grazing Lands" (Old) and "Lone Star Healthy Streams" (New) websites.

Conclusion

This project set out to prepare the Lone Star Healthy Streams Program for grazing cattle, horses, poultry, dairy cattle, and feral hogs for statewide delivery through development of:

- Standardized resource manuals for bacteria runoff management from each species
- Standardized presentations for bacteria runoff management from each species
- Interactive website for bacteria runoff management from each species

The project successfully accomplished this through the development of five standardized resource manuals, five standardized presentations, a website to provide resources for producers and others, and an online course.

The project set out to receive endorsement of the LSHS Program by Steering Committee, LSHS Development Committee, and AgriLife Leadership. Program endorsements were received from the Independent Cattlemen's Association of Texas, Texas Poultry Federation, Texas HORSE, Texas Association of Dairymen, Texas Pork Producers Association, Texas Wildlife Association, Texas Parks and Wildlife Department, Texas and Southwestern Cattle Raisers Association, USDA-Natural Resource Conservation Service, and Grazing Lands Conservation Initiative. Further, this program has been supported by Extension throughout the state ensuring its successful delivery.

Finally, the project set out to promote the availability of the LSHS education program. This was accomplished through development of a brochure and other promotional materials, delivery through the website to almost 1200 unique visitors, and delivery of presentations to audiences at approximately 60 events throughout Texas and the US.

By meeting these measures of success, the project met its goal of expanding the *Lone Star Healthy Streams* education program through integration of grazing cattle, horse, poultry, dairy cattle, and feral hog components into a synergistic, industry endorsed LSHS Program ready for statewide delivery. This in turn is expected to lead to achievement of the project's ultimate goal of reducing the amount of bacteria entering Texas waterbodies from the major classes of livestock and feral hogs through voluntary adoption of BMPs by participants in the program.

Appendix A

TEXAS A&M AGRILIFE EXTENSION

MARKING INSTRUCTIONS

CORRECT: ● INCORRECT: ⊘ ⊗ ✓ ✗

Texas A&M AgriLife Extension Service Standard Customer Satisfaction Survey

Your views on the quality and effectiveness of Extension programs are extremely important. Please take a few minutes to tell us about your experience with this activity. **Please do not write your name on this form so that your responses are anonymous.** Thank you!

SATISFACTION WITH THIS ACTIVITY

1. ***Overall, how satisfied are you with this activity?*** ○ Not at all ○ Slightly ○ Somewhat ○ Mostly ○ Completely

2. ***How satisfied are you with the following aspects of the activity?***

	Not at all	Slightly	Somewhat	Mostly	Completely
a. Information being what you expected to receive	○	○	○	○	○
b. Accuracy of information	○	○	○	○	○
c. Information being easy to understand	○	○	○	○	○
d. Timeliness of information (being received in time to be useful)	○	○	○	○	○
e. Helpfulness of the information in decisions about your own situation	○	○	○	○	○
f. Relevance of the examples used	○	○	○	○	○
g. Instructor's knowledge level of subject matter	○	○	○	○	○
h. Instructor's response to questions	○	○	○	○	○
i. Meeting location in terms of ease of listening and participation	○	○	○	○	○

3. **What would you suggest to improve this or future programs?**

POTENTIAL IMPACT OF THIS ACTIVITY

4. ***Do you plan to take any actions or make any changes as a result of this activity?***

○ Yes
○ No
○ Not sure

If "no" or "not sure," which of the following best describes why? (select one only)

○ Information was not applicable or relevant to my situation
○ Information was relevant to my situation but taking no action is the best decision at this time
○ Need more information before making a decision on action or changes
○ Just wanted the information (had no particular plans to implement)
○ Something else

5. ***Do you anticipate benefiting economically as a direct result of what you learned from this activity?***
○ Yes
○ No

6. **What was the most important or beneficial thing you learned from this activity?**

Please continue on the other side.

1641490005

MARKING INSTRUCTIONS
CORRECT: ■ INCORRECT: ⊘ ⊘ ⊘ ⊘

VALUE OF THIS ACTIVITY & EXTENSION

7. **Based on the information provided at the program, what is the likelihood that you would recommend Texas A&M AgriLife Extension Service to your family and friends as a contact for information presented at this activity?**

Fill in one number below where 0 = not likely and 10 = very likely.

○ 0 ○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9 ○ 10

Not Likely **Very Likely**

8. ***Would you attend an activity on another subject offered by Extension if it addressed a need or interest of yours?***

○ Yes
○ No

9. ***How valuable to you was this opportunity to network with experts and others participants with similar interests?***

○ Not at all ○ Slightly ○ Somewhat ○ Quite ○ Extremely

10. ***Overall, how valuable to you is the information and programs provided by Extension?***

○ Not at all ○ Slightly ○ Somewhat ○ Quite ○ Extremely

PARTICIPANT BACKGROUND

11. ***You are . . .***

○ Female
○ Male

12. ***Your age?***

○ 18 - 24 ○ 40 - 44 ○ 60 - 64
○ 25 - 29 ○ 45 - 49 ○ 65 - 69
○ 30 - 34 ○ 50 - 54 ○ 70 - 74
○ 35 - 39 ○ 55 - 59 ○ 75+

13. ***Racial / Ethnic background? (select one only)***

○ African American (non-Hispanic)
○ Asian American
○ Hispanic
○ Native American
○ White (non-Hispanic)
○ Other
○ Multiracial

14. ***Highest level of education obtained?***

○ Some high school or less
○ High school graduate or GED
○ Vocational or technical degree
○ Some college
○ Bachelor degree
○ Post-graduate degree(s)

15. ***Zip code of your primary residence:***

16. ***Is this your first time to participate in an Extension activity as an adult?***

○ Yes
○ No

Rev. CS Standard Form - meets state req.

THANK YOU!

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